CLAIMS

1. (Currently Amended) A piezoelectric micromotor for moving a moveable element comprising:

a vibrator in the shape of a rectangular parallelepiped formed from a plurality of thin layers of piezoelectric material having first and second identical relatively large rectangular face surfaces defined by long and short edge surfaces wherein the layers are aligned one on top of the other and have their face surfaces bonded together;

electrodes on surfaces of the layers;

a contact region located on one or more edge surfaces of the layers, urged against the body; and

a least one electrical power supply configured to electrify a first configuration of some of the electrodes to excite and control only longitudinal vibrations in the vibrator parallel to the long edge surfaces and a second configuration of electrodes to excite and control only transverse vibrations in the vibrator parallel to the short edge surfaces ~~that electrifies electrodes to excite vibrations in the vibrator and thereby in the contact region that impart motion to the body~~;

~~wherein at least some of the electrodes are electrifiable to excite transverse vibrations in the vibrator, which transverse vibrations are vibrations parallel to the one or more edges of the layers on which the contact region is situated and at least some of the electrodes are electrifiable to excite longitudinal vibration in the vibrator that are perpendicular to the one or more edges and the at least one power supply controls electrification to independently control excitation of longitudinal and transverse vibrations~~ so as to selectively generate different forms of vibratory motion in the vibrator.

2. (Original) A piezoelectric micromotor according to claim 1 wherein the one or more edge surfaces are short edge surfaces of the layers.

3. (Previously Presented) A piezoelectric micromotor according to claim 1 and including a wear resistant element situated at the contact region for contact with the body.

4. (Previously Presented) A piezoelectric micromotor according to claim 1 wherein the at least one power supply electrifies the electrodes to excite elliptical vibrations in the vibrator having different eccentricities.

5. (Cancelled)

6. (Previously Presented) A piezoelectric micromotor according to claim 1, comprising:

a single large electrode on a first face surface of each layer; and

four quadrant electrodes on the second face surface of at least one layer, wherein the quadrant electrodes are arranged in a checkerboard pattern.

7. (Previously Presented) A piezoelectric micromotor according to claim 6 wherein at least two non-contiguous face surfaces have quadrant electrodes.

8.-9. (Cancelled)

10. (Previously Presented) A piezoelectric micromotor according to claim 6 wherein for at least one layer the at least one power supply electrifies a first pair of diagonally disposed quadrant electrodes with a first AC voltage and a second pair of quadrant electrodes along a second diagonal with a second AC voltage and wherein the first and second AC voltages are 180^{o} out of phase and have a same magnitude, so as to excite transverse vibrations in the piezoelectric vibrator.

11. (Original) A piezoelectric motor according to claim 10 wherein the at least one layer comprises a plurality of layers and wherein homologous electrodes on different layers of the plurality of layers are electrified with the same voltage.

12. (Previously Presented) A piezoelectric motor according to claim 43 wherein the at least one power source controls magnitudes of AC voltages used to excite longitudinal and transverse vibrations to selectively provide different forms and amplitudes of vibratory motion of the contact region in a plane parallel to the planes of the layers.

13. (Previously Presented) A piezoelectric motor according to claim 43 wherein the at least one power source controls phases of AC voltages used to excite longitudinal and transverse vibrations to selectively provide different forms of vibratory motion of the contact region in a plane parallel to the planes of the layers.

14. (Previously Presented) A piezoelectric motor according to claim 43 wherein the at least one power source controls frequencies of AC voltages used to excite longitudinal and

transverse vibrations to selectively provide different forms of vibratory motion of the contact region in a plane parallel to the planes of the layers.

15. (Previously Presented) A piezoelectric micromotor according to claim 6 wherein for at least one layer the at least one power supply electrifies a first pair of electrodes along a first short edge of the layer and a second pair of quadrant electrodes along a second short edge with first and second AC voltages respectively that are 180° out of phase and have a same magnitude, so as to excite bending vibrations perpendicular to the planes of the layers in the piezoelectric vibrator.

16. (Original) A piezoelectric motor according to claim 15 wherein the at least one layer comprises a plurality of layers.

17. (Original) A piezoelectric motor according to claim 16 wherein homologous electrodes on layers located on a same side of a face surface inside the vibrator are electrified in phase and homologous electrodes on layers located on opposite sides of the face surface are electrified 180° out of phase.

18. (Previously Presented) A piezoelectric motor according to claim 49 wherein the at least one power source controls magnitudes of AC voltages used to excite longitudinal and bending vibrations to selectively provide different forms and amplitudes of vibratory motion of the contact region in a plane perpendicular to the planes of the layers.

19. (Previously Presented) A piezoelectric motor according to claim 49 wherein the at least one power source controls phases of AC voltages used to excite longitudinal and bending vibrations to selectively provide different forms of vibratory motion of the contact region in a plane perpendicular to the planes of the layers.

20. (Previously Presented) A piezoelectric motor according to claim 49 wherein the at least one power source controls frequencies of AC voltages used to excite longitudinal and transverse vibrations to selectively provide different forms of vibratory motion of the contact region in a plane parallel to the planes of the layers.

21. (Previously Presented) A piezoelectric micromotor according to claim 6 wherein, for at least one layer, the at least one power supply electrifies a pair of quadrant electrodes that lie

along a first diagonal of the layer with an AC voltage while a pair of quadrant electrodes along a second diagonal of the layer are grounded or floating, in order to excite elliptical vibrations in the vibrator.

22. (Original) A piezoelectric micromotor according to claim 21 wherein the at least one layer comprises a plurality of layers and wherein homologous electrodes are electrified with the same AC voltage.

23. (Previously Presented) A piezoelectric motor according to claim 21 wherein the at least one power supply controls the frequency of the AC voltage to selectively control the eccentricity of the elliptical motion.

24. (Previously Presented) A piezoelectric micromotor according to claim 1 and comprising at least one relatively thin layer of non-piezoelectric material having large rectangular face surfaces defined by long and short edges and relatively narrow long and short edge surfaces.

25. (Original) A piezoelectric micromotor according to claim 24 wherein the one of the edges of the at least one non-piezoelectric layer are substantially equal in length to one of the corresponding edges of the piezoelectric layers.

26. (Original) A piezoelectric motor according to claim 25 wherein the one edge is a short edge.

27. (Previously Presented) A piezoelectric micromotor according to claim 25 wherein the other edges of the at least one non-piezoelectric layer are slightly longer than the corresponding other edges of the piezoelectric layers so that at least one edge surface of the non-piezoelectric layer protrudes from the piezoelectric layers.

28. (Original) A piezoelectric motor according to claim 27 wherein the other edge is the long edge and wherein at least one short edge surface of the non-piezoelectric layer protrudes from the piezoelectric layers.

29. (Previously Presented) A piezoelectric micromotor according to claim 27 wherein the contact region comprises a region of one of the at least one protruding edge surface.

30. (Previously Presented) A piezoelectric micromotor according to claim 25 wherein the at least one non-piezoelectric layer is formed from a metal.

31. (Previously Presented) A piezoelectric micromotor according to claim 15 wherein the power supply is capable of electrifying the electrodes to cause motion in a selective arbitrary direction in the plane of edge surfaces on which the contact region is located.

32.-42. (Cancelled)

43. (Previously Presented) A piezoelectric micromotor according to claim 10 wherein the at least one power supply electrifies all quadrant electrodes on the second face surface of at least one but not all the layers with a same AC voltage so as to excite longitudinal vibrations in the vibrator.

44. (Previously Presented) A piezoelectric micromotor according to claim 10 and comprising a single large electrode on the second face surface of at least one but not all layers.

45. (Previously Presented) A piezoelectric micromotor according to claim 44 wherein the power supply electrifies a large electrode on the second face surface of at least one layer with an AC voltage to excite longitudinal vibrations in the vibrator.

46. (Previously Presented) A piezoelectric motor according to claim 45 wherein the at least one power source controls magnitudes of AC voltages used to excite longitudinal and transverse vibrations to selectively provide different forms and amplitudes of vibratory motion of the contact region in a plane parallel to the planes of the layers.

47. (Previously Presented) A piezoelectric motor according to claim 45 wherein the at least one power source controls phases of AC voltages used to excite longitudinal and transverse vibrations to selectively provide different forms of vibratory motion of the contact region in a plane parallel to the planes of the layers.

48. (Previously Presented) A piezoelectric motor according to claim 45 wherein the at least one power source controls frequencies of AC voltages used to excite longitudinal and transverse vibrations to selectively provide different forms of vibratory motion of the contact region in a plane parallel to the planes of the layers.

49. (Previously Presented) A piezoelectric micromotor according to claim 15 wherein the at least one power supply electrifies all quadrant electrodes on the second face surface of at least one but not all the layers with a same AC voltage so as to excite longitudinal vibrations in the vibrator and thereby in the contact region.

50. (Previously Presented) A piezoelectric micromotor according to claim 15 and comprising a single large electrode on the second face surface of at least one but not all layers.

51. (Previously Presented) A piezoelectric micromotor according to claim 50 wherein the power supply electrifies a large electrode on the second face surface of at least one layer with an AC voltage to excite longitudinal vibrations in the vibrator.

52. (Previously Presented) A piezoelectric motor according to claim 50 wherein the at least one power source controls magnitudes of AC voltages used to excite longitudinal and transverse vibrations to selectively provide different forms and amplitudes of vibratory motion of the contact region in a plane parallel to the planes of the layers.

53. (Previously Presented) A piezoelectric motor according to claim 50 wherein the at least one power source controls phases of AC voltages used to excite longitudinal and transverse vibrations to selectively provide different forms of vibratory motion of the contact region in a plane parallel to the planes of the layers.

54. (Previously Presented) A piezoelectric motor according to claim 50 wherein the at least one power source controls frequencies of AC voltages used to excite longitudinal and transverse vibrations to selectively provide different forms of vibratory motion of the contact region in a plane parallel to the planes of the layers.

55. (Previously Presented) A piezoelectric micromotor for moving a moveable element comprising:

a vibrator in the shape of a rectangular parallelepiped formed from a plurality of thin layers of piezoelectric material having first and second identical relatively large rectangular face surfaces defined by long and short edge surfaces wherein the layers are aligned one on top of the other and have their face surfaces bonded together;

a single large electrode on a first face surface of each layer;

four quadrant electrodes arranged in a checkerboard pattern on the second face surface of at least one layer

a contact region located on one or more edge surfaces of the layers, urged against the body; and

a least one electrical power supply that electrifies pairs of quadrant electrodes disposed along different diagonals with AC voltages that are 180° out of phase with each other to excite transverse vibrations parallel to the at least one or more edges and all quadrant electrodes on the second face surface of at least one but not all the layers with a same AC voltage to excite longitudinal vibrations in the vibrator and controls magnitudes of AC voltages used to excite longitudinal and transverse vibrations to selectively provide different forms and amplitudes of vibratory motion of the contact region in a plane parallel to the planes of the layers.

56. (Previously Presented) A piezoelectric micromotor for moving a moveable element comprising:

a vibrator in the shape of a rectangular parallelepiped formed from a plurality of thin layers of piezoelectric material having first and second identical relatively large rectangular face surfaces defined by long and short edge surfaces wherein the layers are aligned one on top of the other and have their face surfaces bonded together;

a single large electrode on a first face surface of each layer;

four quadrant electrodes arranged in a checkerboard pattern on the second face surface of at least one layer

a contact region located on one or more edge surfaces of the layers, urged against the body; and

a least one electrical power supply that electrifies pairs of quadrant electrodes disposed along different diagonals with AC voltages that are 180° out of phase with each other to excite transverse vibrations parallel to the at least one or more edges and all quadrant electrodes on the second face surface of at least one but not all the layers with a same AC voltage to excite longitudinal vibrations in the vibrator and controls phases of AC voltages used to excite longitudinal and transverse vibrations to selectively provide different forms of vibratory motion of the contact region in a plane parallel to the planes of the layers.

57. (Previously Presented) A piezoelectric micromotor for moving a moveable element comprising:

a vibrator in the shape of a rectangular parallelepiped formed from a plurality of thin layers of piezoelectric material having first and second identical relatively large rectangular

face surfaces defined by long and short edge surfaces wherein the layers are aligned one on top of the other and have their face surfaces bonded together;

a single large electrode on a first face surface of each layer;

four quadrant electrodes arranged in a checkerboard pattern on the second face surface of at least one layer

a contact region located on one or more edge surfaces of the layers, urged against the body; and

a least one electrical power supply that electrifies pairs of quadrant electrodes disposed along different diagonals with AC voltages that are 180° out of phase with each other to excite transverse vibrations parallel to the at least one or more edges and all quadrant electrodes on the second face surface of at least one but not all the layers with a same AC voltage to excite longitudinal vibrations in the vibrator and controls frequencies of AC voltages used to excite longitudinal and transverse vibrations to selectively provide different forms of vibratory motion of the contact region in a plane parallel to the planes of the layers.

58. (New) A method of controlling a piezoelectric motor comprising a multilayer vibrator in the shape of a rectangular parallelepiped formed from a plurality of thin layers of piezoelectric material having relatively large rectangular face surfaces defined by long and short edge surfaces and electrodes on face surfaces of the layers, the method comprising:

determining at least one first configuration of the electrodes electrifiable to excite and control substantially only longitudinal vibrations in the vibrator parallel to the long edges;

determining at least one second configuration of the electrodes electrifiable to excite and control substantially only transverse vibrations in the vibrator parallel to the short edges; and

electrifying first and second configurations of electrodes independently of each other to selectively generate different forms of vibratory motion in the vibrator.